

THE ANATOMY AND RELATIONSHIPS OF *HELIX SUBPLICATA*,
SOWERBY.

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Helix subplicata is a fine species, of the general form of *H. aspersa*, confined to the island of Porto Santo, one of the Madeira group. It was described by G. B. Sowerby in 1824 (*Zool. Journ.*, i, p. 56, pl. 3, fig. 1) from specimens collected by Mr. T. E. Bowdich. For many years it was only known as an extinct species, fossil in the sandy Pleistocene deposits of Porto Santo. In the spring of 1848, however, it was found alive by Wollaston and Armitage on the Ilheo de Baixo, or Lime Island, the largest of the islets round Porto Santo. The living specimens showed that the shell was covered with a rich brown periostracum, and was wholly without bands or spots. When I was recently in Porto Santo I obtained a good series of fossil *H. subplicata*, varying much in size, in the vicinity of the Fonte d'Areia, on the main island. I visited the Lime Island and found one shell with the periostracum on the steep slope of the eastern side. On returning to Funchal I called on the Rev. Drummond Paterson, who very kindly placed at my disposal a couple of living *H. subplicata*, collected by Mr. José de Souza on the Lime Island. I was thus able to examine the anatomy and fix the position of the species in the classification.

H. subplicata crawls freely by day, and is not easily alarmed. When it crawls the foot projects behind the shell, but the head is only 2 or 3 mm. in front of the lip, instead of being far extended as in *H. aspersa*. The animal is of a very dark plumbeous colour, almost black, with oculiferous tentacles long (about 13 mm.); the inferior tentacles are also long; mantle grey; foot pointed behind; sole plumbeous, dilute grey in middle. There is a greater distance between the lower and the oculiferous tentacles than in *H. aspersa*. The rugæ are essentially as in *aspersa*. The shell is peculiar, not only for the strong transverse riblets, but especially for the character of the apical whorls, which show, except at the extreme apex, close-set, strong pustuliform granules, arranged more or less clearly in oblique decussating series. In this character the shell differs conspicuously from *H. aspersa*, as well as from *H. mazzullii*, *Leptaxis furva*, and *embescens*, *L. phlebophora*, etc. It resembles, in this peculiarity of sculpture alone, the extinct *Plebecula bowditchiana*, Fér., as well as certain other shells not closely related.

Pilsbry (*Man. Conch.*, 2nd ser., ix, p. 309), in another connection, comments on this type of sculpture thus: "A thorough study of the Miocene Helices is necessary to determine whether the peculiar sculpture which occurs in so many forms is a character assumed

simultaneously by many subgenera and genera, or an indication of actual genetic relationship. Not much evidence can be adduced in favour of the latter view from the recent fauna, for species of widely different genera exhibit the hairs or papillæ arranged in obliquely decussating series; in *Hygromia*, *H. consona*, *lanuginosa*, etc. . . . in *Thysanophora*, *T. stigmatica* and its allies; in *Eulota*, numerous oriental species. The list could be indefinitely increased. It will be perceived from this that those authors who insist upon the presence of *Chloritis* in the European Miocene fauna, stand upon narrow and insecure footing." It may well be, however, that the facts are somewhat intermediate between the two diverse views postulated; namely, that the character is ancient and does indicate a remote common descent, but has been lost in the majority of living species. It seems significant that it is specially characteristic of a number of Tertiary forms.

An examination of the anatomy of *H. subplicata* shows that it is not, as I had expected on account of the sculpture of the shell, related to the other Helicidæ of the Madeira Archipelago. It falls near true *Helix*, of which it may be considered to represent a subgenus, for which I propose the name *Idiomela*. The principal characters of this monotypic subgenus (or genus?) are as follows:—

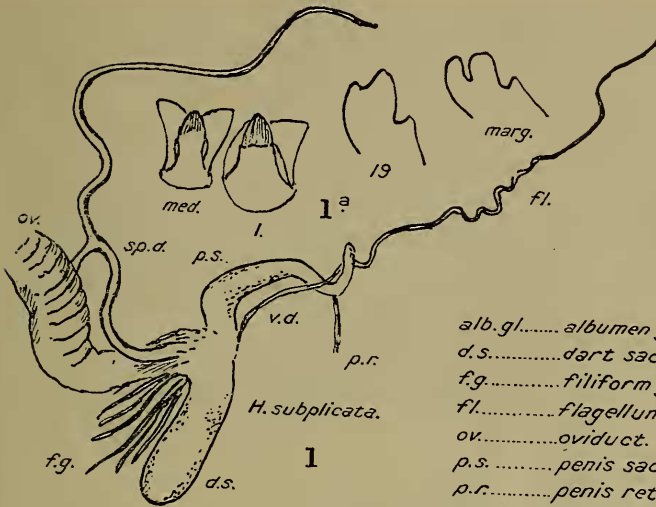
IDIOMELA subg.n.

Type *Helix subplicata* Sowerby. Shell large, shaped essentially as in *H. aspersa*, but apical whorls with closely set decussating rows of papillæ or granules; last whorl with strong transverse plicæ or ribs; periostracum brown, without bands or spots.

Jaw strongly curved, very dense and dark, with five ribs, the outer ones feeble, but the inner three strong, extending beyond the margin. This is of the same general type as the jaw of *H. hortensis*, but has fewer ribs than *H. aspersa*.

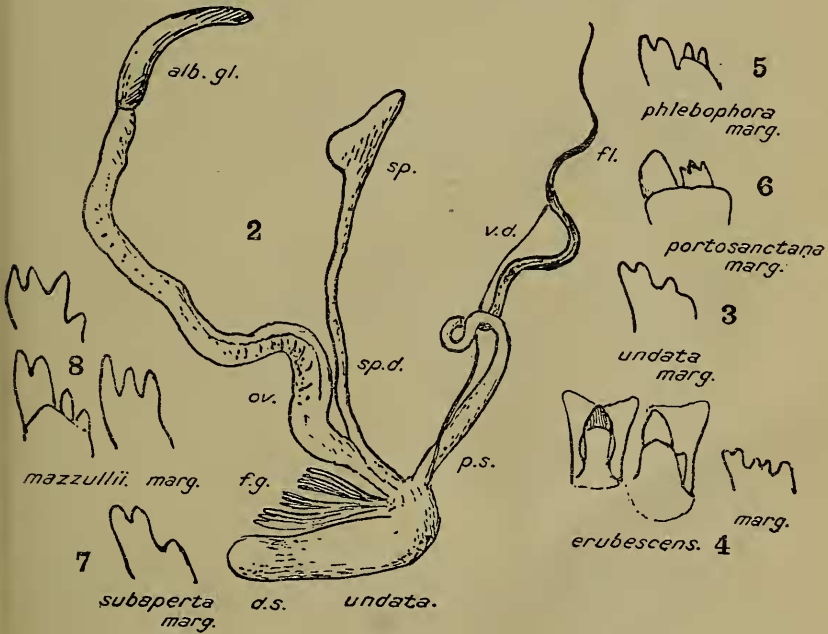
Radula of the usual *Helix* type (Fig. 1a); the median teeth with only rudimentary, non-angulate, side cusps; laterals with similar rudimentary, merely band-like, ectocones, but about the fourteenth tooth a distinct cusp begins to appear, and from the eighteenth onwards the main or inner cusp is bifid; marginals trifid. The radula thus differs from *H. pomatia* and *aspersa*, and resembles *H. nemoralis* and *hortensis*, in the absence of salient lateral cusps on the median and principal lateral teeth. The marginals are much as in *H. hortensis*, but with very blunt lobes on the inner part.

Genitalia of the *Helix* type (Fig. 1), with large dart-sac, filiform mucus glands, and very long flagellum. Dart about 9 mm. long, straight, hardly constricted above the base, with four sharp longitudinal keels at right angles to each other, the channels between them with a few irregular transverse films, but they are not regular or numerous, as in *aspersa*. Dart-sac about 11 mm. long and 4 broad, the end not at all differentiated. Filiform glands not so numerous



H. subplicata.

- alb. gl.*..... albumen gland.
- d.s.*..... dart sac.
- f.g.*..... filiform glands.
- fl.*..... flagellum.
- ov.*..... oviduct.
- p.s.*..... penis sac.
- p.r.*..... penis retractor.
- sp., sp.d.*..... spermatheca & ducts.
- v.d.*..... vas deferens.



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as in *aspersa*, little branched (much branched in *aspersa*), the longest about 12 mm. The filiform glands are thus more like those of *nemoralis* than *aspersa*. Flagellum very long (38 mm.), spirally twisted in middle; penis retractor to vas deferens about 5 mm. Spermatheca very long (prox. 48 mm.), slender, and cylindrical, with a basal cæcum imbedded in uterus. (All measurements from fresh material.)

On comparing the genitalia with those of *Leptaxis* (*Cryptaxis*) *undata* (Lowe),¹ from Funchal, Madeira, it at once appears that there is little affinity, in spite of a certain similarity in the sculpture of the shell. I give a figure of the genitalia of *L. undata* (Fig. 2), showing the filiform glands, short (11·5 mm.) flagellum, and boot-shaped end of spermatheca, all very different from *Idiomela*. The albumen-gland is about 10 mm. long. In the Gwatkin collection at the British Museum I found radulæ and jaws of a number of Madeiran Helicoids—even a radula of *H. subplicata*, exactly like my specimen, but erroneously labelled “Madeira”. The following notes will serve to show some of the various differences between these snails and *H. subplicata*.

Leptaxis, sens. Pilsbry.

L. erubescens, Lowe (type of genus). Median teeth small, with rudimentary side cusps; first laterals with well-developed ectocones; marginals with inner cusps broad, feebly to strongly emarginate; outer cusp bifid or trifid, if bifid it is the outer lobe that is obsolete (Fig. 4).

L. undata, Lowe (*Cryptaxis*). Lateral cusps of median teeth more distinct but small; laterals with distinct but little produced ectocones, often slightly emarginate; marginals with inner cusp strongly emarginate, the lobes very obtuse, the outer cusp simple by the suppression of the outer lobule, or the latter may be slightly developed (Fig. 3).

L. phlebophora, Lowe (*Katostoma*). Jaw with about twenty-six flattened contiguous ribs, somewhat as in *H. terrestris*, Penn.; median and lateral teeth with small, hardly produced, outer cusps; marginals with inner cusp deeply bifid, obtuse, outer bilobed (Fig. 5).

L. portosanctana, Sowerby (*Pseudocampylæa*). Sowerby's original paper has the name *portosanctana*, possibly a misprint. Jaw with fourteen broad, closely set ribs; central teeth with well-developed side cusps; laterals with well-developed ectocones; marginals with very broad inner cusp, simple or feebly emarginate; outer with two or three sharp points. The lateral cusps of central teeth are little produced (Fig. 6).

¹ Unfortunately the name of this common Madeira snail must be changed, since there is an earlier name, *Helix undata* Gmelin, 1790, based on an entirely different shell, figured by Gualtieri. Gmelin gives no locality, but Wood (“Index Testaceologicus,” 1825) says it is from New Holland. *Helix undata* Lowe, Cambr. Phil. Soc. Trans., iv, p. 41 (1831) must be called *Leptaxis* (*Cryptaxis*) *groviana* (Férussac).

Plebecula.

P. punctulata, Sowerby (*Helicomela*). Median teeth with small side cusps, their upper margin horizontal, not rising above lateral notch; first laterals with strong triangular ectocones; marginals with outer cusp bifid and inner simple, thus wholly unlike *Idiomela*.

Geomitra.

G. bicarinata, Sowerby (*Hystricella*). Jaw with ten broad, flattened ribs, with narrow intervals between; median teeth with small lateral cusps; first laterals with large ectocones; marginals with inner cusp strongly bifid, outer also bifid, all the points sharp, wholly unlike *Idiomela*. *G. echinulata*, Lowe, has teeth like *bicarinata*.

G. polymorpha var. *discina*, Lowe (*Discula*). Jaw clear yellowish, with ten broad, flattened ribs, just as in *bicarinata*; median teeth with distinct lateral cusps; laterals with distinct ectocones; marginals with long sharp inner cusp, with small and sharp lobe on inner side, outer cusp bifid.

In Pilsbry's classification, *H. subplicata* falls in the section or group *Ercella*, Monts., the type of which is the Sicilian *H. mazzullii*, Jan. The radulla of *H. mazzullii* from Palermo has the centrals with very small angular side cusps; laterals with well-developed ectocones, strongly angulate; marginals, very variable, three or four lobed (Fig. 8).

H. subaperta, Ancey from Algeria has been referred to the same group, but it is very distinct. The median teeth have distinct cusps; laterals with large side cusps, equally strong on each side, so that they are nearly symmetrical; marginals with inner cusp strongly bifid, the lobes obtuse, outer simple and rudimentary (Fig. 7). These species show little resemblance to *Idiomela*.

There is reason to believe that while the present island of Porto Santo contains no rocks bearing fossils older than the Miocene, it rests upon an older basis, now submerged. The snail fauna seems to represent the remnants of the life of this older, doubtless Mesozoic, land. *Idiomela* may be regarded as an isolated type, related to the common stem of the continental *Helix*, but distinct from any of the living or fossil continental genera.

The species *H. subplicata* is at least as old as the Pleistocene, to which period the fossil specimens must be referred. West of the Villa Baleira is a region in which, some 30 feet below the surface, a bed of marine Pleistocene rests upon a basis of dark volcanic rock, and is covered by sands containing land shells. The land shells are, however, not necessarily younger than the marine beds, as the sand, shifting as it does to-day, may have been blown over them. At any rate, I found a specimen of *Geomitra coronata*, Desh., firmly embedded in the dense marine deposit, mixed with the marine shells